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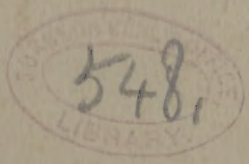
REPRINTED FROM THE

New York Medical Journal

for August 24, 1895.



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CEREBRAL ARTERIAL THROMBOSIS.*

By GUSTAVUS ELIOT, A. M., M. D.,
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The arteries of the brain may be obstructed, from the interior, in two ways. A small mass of extraneous material may be carried in the blood from some other part of the body to the brain, and, having reached an artery of too small a calibre to permit its passage further, may become lodged and obstruct the flow of blood through the vessel. Such an obstructing mass is called an embolus. On the other hand, the blood may coagulate in one or more of the arteries of the brain, and form a clot which obstructs the circulation. Such a clot is called a thrombus. The pathological process which results in the formation of a thrombus is called thrombosis. The results which follow the obstruction of one of the cerebral arteries by an embolus or a thrombus are so similar, and also so closely resemble the effects of a rupture of one of the cerebral arteries, that some writers describe these three distinct pathological lesions and their results in a single chapter. But the lesions themselves are so distinct, and the therapeutic

* Read by title at the one hundred and third annual meeting of the Connecticut Medical Society, at Hartford, May 23, 1895.

measures which are adapted to each condition are so different, that one may not unwisely—even at the risk of some repetition—discuss the three conditions separately. The present paper will be limited to a study of thrombosis of the cerebral arteries and its consequences.

The formation of a thrombus in a cerebral artery may be due to a diminution in the calibre of the vessel by external pressure, or as a result of disease; to a pathological alteration of the endothelial lining of the vessel; to a change in the quality of the blood; or to a diminution in the force and rapidity of the flow of the blood in the artery. Frequently two or more of these abnormal conditions co-operate in favoring the formation of a thrombus. The most important of these conditions is a change in the structure of the lining membrane of the vessels. This may consist of a fatty, atheromatous, calcareous, or syphilitic degeneration of the endothelium, or of endarteritis deformans. When either of these changes is present, slow and weak action of the heart is an important accessory cause. These structural changes, except when due to syphilis, are more common in advanced age. Consequently, thrombosis is observed most frequently in old persons. The deterioration in the quality of the blood which predisposes to thrombosis occurs in individuals who have suffered from one of the infectious diseases, and therefore the disease may sometimes be seen in young persons. When it is due to syphilis, it also usually occurs among those who are not yet old.

When a cerebral artery becomes obstructed by the formation of a thrombus, the usual result is anæmia of that portion of the organ which is supplied with blood by the affected artery. This interferes with the nutrition of the part, and is followed by necrosis and softening. In certain situations the collateral circulation may furnish a sufficient

supply of blood, so that the nutrition of the part is not permanently cut off. The thrombus itself may become organized, or may undergo calcareous degeneration, or may soften and break down, and portions of it may be carried into other parts of the circulatory system.

The symptoms depend upon the location of the thrombus and the rapidity of its formation. Their onset is usually gradual. The most common premonitory symptoms are headache, dizziness, numbness of the extremities, impairment of memory, mental disturbance, difficulty of speech, and weakness of the muscles of the extremities. The attack may, however, be sudden, and then the most prominent feature is paralysis. In all severe cases paralysis occurs sooner or later. It may come on suddenly or gradually. The distribution and extent of the paralysis depend, of course, upon the localization of the lesion. Both sensation and motion are usually affected. If the lesion is not so extensive or located in such a position as to cause speedy death, gradual improvement may occur. Relapses, however, may be expected, because the arterial degeneration which predisposes to the formation of a thrombus does not tend to recovery, and because it affects arteries in different parts of the brain simultaneously.

The diagnosis of cerebral arterial thrombosis must be considered with reference to cerebral embolism and cerebral hæmorrhage. Nor is it always possible to make a certain diagnosis. If a young person who has a cardiac lesion, but is in other respects in good health and has not recently suffered with any blood-destroying disease, suddenly becomes hemiplegic, the disease is probably cerebral embolism. If a person over forty years of age, who has calcareous arteries or the arcus senilis, who has also a florid complexion and a strong pulse, suddenly becomes hemiplegic and comatose, the disease is probably cerebral hæm-

orrhage. If, on the other hand, a patient who is past middle age, who presents external evidence of arterial degeneration, and who has a weak heart, suffers from dizziness, numbness of one or of several extremities, headache, difficulty of speech, impairment of mind, and weakness increasing to paralysis of sensation and motion of certain muscles, the disease is probably cerebral thrombosis. But the problem is not usually so simple. Cerebral thrombosis is not limited to old persons. It may occur in those who have organic cardiac disease, and the symptoms may develop suddenly. On the other hand, cerebral hæmorrhage may be preceded by premonitory symptoms, the symptoms of its occurrence may come on rather gradually, coma may be slight and transient, and paralysis may be partial and may gradually diminish.

The prognosis of cerebral arterial thrombosis is not very favorable. The disease usually occurs in persons who already are enfeebled by disease or age. The most common predisposing causes are associated with the degenerations of advanced age. These degenerative changes take place before the thrombus forms, and it is not easy to restore to a normal condition structures which have already undergone degeneration. Consequently, the disease is likely to be progressive or recurrent. Considerable improvement may occur. The patient may continue to live for a long time, and most of the symptoms which have been present may disappear, but generally after a time other attacks occur, and ultimately he dies as a result of the cerebral disease. If the patient becomes comatose, the chances of recovery are greatly diminished.

The indications for treatment are to increase the action of the heart, to increase the calibre of the arteries, and to diminish the coagulability of the blood. No single drug fulfills these indications more completely than ammonia.

The most useful preparations are the carbonate and the aromatic spirit. In urgent cases the dose should be frequently repeated. The bromides promote relaxation of the vessels and relieve cerebral irritability. The iodides also aid in causing relaxation of the vessels, and diminish the coagulability of the blood. An admirable combination recommended by Bartholow consists of a mixture of ammonium carbonate, ammonium bromide, and ammonium iodide in solution of ammonium acetate. In cases of chronic cerebral arterial thrombosis, with symptoms of moderate severity, this combination of remedies is exceedingly useful. It is, however, unfortunately very unpalatable. If it is necessary to render it more agreeable in taste, the ammonium iodide may be omitted. If insomnia and restlessness are not conspicuous symptoms, the ammonium bromide may be omitted. If still further change is necessary, the compound syrup of sarsaparilla may be substituted for a part of the solution of ammonium acetate, or the whole of the latter may be omitted, and the unpleasant flavor of the ammonium carbonate may be partially disguised by the addition of acacia.

Another remedy of great value is alcohol, which increases the action of the heart and causes relaxation of the arteries. Digitalis or strophanthus may be used to increase the force of the heart's action, but nitroglycerin should generally be given in connection with either of them. Strychnine is useful both as a cardiac and as a general tonic.

In addition to the administration of drugs with special reference to the condition of the cerebral arteries and of the circulation in them, it is important also to promote the general nutrition of the entire body. Free action of the bowels must be secured. The secretion of the kidneys must be maintained. The stomach must be kept in good condition, so that food may be easily assimilated. The

patient must be kept quiet. The surface of the body and the extremities must be kept warm. Abundance of fresh air must be provided. The diet should be light and easily digestible. An adequate amount of sleep must be insured. As the symptoms subside, tonics, with gentle massage, assist in improving the patient's condition.

No. 209 Church Street.

The New York Medical Journal.

A WEEKLY REVIEW OF MEDICINE.

EDITED BY

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PUBLISHED BY

D. APPLETON & CO., 72 Fifth Avenue, New York.